CRATERS OF THE MOON NATIONAL MONUMENT AND PRESERVE DEER SURVEY AND OBSERVATIONS 2007

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Executive Summary

Mule deer surveys were performed during the spring and fall of 2007. These included unstructured spring surveys as well as the systematic fall surveys in the north end of the monument. Systematic road surveys were continued on the loop road in addition to the usual informal count during May and June.

The number of does continued to decline from the previous three year period. Numbers were about a quarter of the 15 year average. Yearlings were also down with numbers about a third of the 15 year average. Over-winter survival of fawns was not calculated and reported due a very small and statistically skewed sample size.

The fall survey recorded numbers that were half or less the of 15 year average for all age classes. The fawn to adult female ratio increased slightly to reach a 3 year high. This may indicates a slight increase in birth rates or an increase in early fawn survival. The total population estimate also showed a siniliar increase but was still less than half of the 15 year average. This was likely influenced by drought conditions continuing through most of the last five years.

When the data was averaged into three year intervals the deer population shows a general pattern of decline since the mid 1980s and reaching its lowest point in the current period. The numbers of all age/sex classes have continued a decline started in 2000.

The moose population in Little Cottonwood continues to remain stable with one pair of adults and one or two calves in a season. In addition to the Little Cottonwood/Leech Creek Population a yearling was seen near Lava Lake indicating that animals are dispersing from either Fish Creek or Barn Creek and moving through the Preserve.

The Idaho Department of Fish and Game has been augmenting elk herds in the vicinity of Bear Trap cave in the BLM portion of the monument. This herd has continued to expand with numerous sightings in the Preserve.

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Introduction

Monitoring of the mule deer population began in 1980 when Griffith initiated a study on the population dynamics and habitat use of the monument's deer herd (Griffith, B. 1983. Ecological characteristics of mule deer: Craters of the Moon National Monument, Idaho. Report B-83 2. Coop. Park Studies Unit. Univ. of Idaho, Moscow 109 pp.). As a result of this study Griffith developed site specific Standard Operating Procedures (SOP) for the continued monitoring of the deer population using an annual spring and late summer deer survey. These surveys were first performed in 1984 and have been conducted each year since.

Moose were first observed in Little Cottonwood Creek in June of 1999. Observations since that time suggest that a breeding population has been established and is persisting. Observations were recorded of moose and entered in to the wildlife observations database.

Prior to 2005 elk were considered to be very rare in the Monument and Preserve area southwest of Hwy 20/26. The Idaho Fish and Game Commission has closed the hunting season in this area since the 1940s. From 2004 to 2006 the Idaho Department of Fish and Game transplanted numerous elk into the portion of the monument managed by the Bureau of Land Management (BLM). This herd has continued to expand and reoccupy former elk range in the Preserve. As this happens it is of interest which areas of the Preserve are being colonized.

Methods

The spring survey is in informal survey conducted from late April until 30 June. During this period the monument staff was requested to record any mule deer sighted. Most of these observations were made while in the field conducting other duties such as ranger patrols or other wildlife monitoring. Deer sighted were classified as adult males, adult females, yearlings and unknown. Starting in the spring of 1998 systematic road surveys were conducted in addition to the usual informal survey. The spring road surveys were conducted on the loop road starting at the Visitor Center and ending at the end of the one way section of the loop road. The route used included the spur road to the tree molds parking area but did not include the road to Devil's Orchard trailhead.

Late summer and early fall surveys were conducted from a vehicle along the 3.9 mile section of secondary road that runs from the North End gate off Highway 26 to the old Martin Mine site in the

north end of the monument (appendix 2). Observations began 10 minutes after sunrise and were made in one direction only. Survey days were evenly distributed over the four week period, avoiding mornings with rain or winds greater than 10 mph. As with the spring surveys, all sightings were classified according to sex and age (adult, yearling, fawn). Surrounding hillsides, lava flows, and valleys along the route were carefully observed with the use of binoculars and a spotting scope. All surveys took approximately two hours to complete. Eight surveys were completed during the period from August 17 to September 13.

Over-winter survival rates were determined using the spring and previous year's late summer survey data. In order to get more normally distributed data for analysis the highest and lowest counts were dropped leaving the 6 middle surveys for statistical analysis. Population means, ratios and percent change estimates were calculated for all age/sex classes. Population estimates and 95% confidence intervals were calculated using data from the six late summer surveys. Standard error estimates for each age and sex class in the late summer survey were calculated and 95% confidence intervals established using the student t-test. For the equations used to calculate these parameters see the Craters of the Moon Mule Deer Survey Standard Operating Procedures (SOP).

For moose and elk incidental observations are recorded primarily in the course of other work in the areas of interest.

Results

SPRING SURVEY

The number of adult does observed in the spring surveys was 30 (table 1). The number of yearlings was 12. No deer were observed on 3 mornings of the spring road survey. Over-winter fawn survival is not reported. The protocol for this survey requires a minimum spring count of 100 animals and state that 200 or more animals is preferable. The total for 2007 was 42. 2002 was the first year since this survey began in 1984 that the population statistics were not calculated due to a too small sample size. Spring observations have continued to decline since that year.

FALL SURVEY

The mean number of deer in most sex/age classes showed a slight increase from the 2006 count (Table 1). The only exception was adult males which had a mean count of 0.7 this was a significant decrease from 2006 which was the highest count for males in over 10 years. Adult females showed an annual mean of 8.8 which was a 61% increase from 2006 (fig 1). Although, it is still below the

15 year average of 19 and an average of 10.6 for the previous 3 years.

Fawns showed a similar increase with a mean of 6.7 or 54% increase from 2006 (fig 1). This compared to an average of 8.1 for the previous 3 years and 15 year average of 18. The total number of deer observed also showed a slight increase with a mean of 17.2. This was statistically insignificant ($p=0.362$) from the 2006 annual mean of 15.2. This compares to a mean of 21 for the previous 3 years and 15 year average of 41.

These observed changes were rather varied in size between age groups. Changes in all age classes except the yearling male numbers were statistically significant at $p<0.05$ ($p=0.000$).

MOOSE

Seven individual observations of moose were recorded during 2007 thru Oct 1. These observations included a minimum population of 5 animals. A minimum of 1 adult male, 2 yearlings, one female, and a calf were observed in the Leech Creek/Little Cottonwood drainage during 2007. In addition to the animals regularly seen in the Leech and Little Cottonwood Creeks, one yearling was observed in the northern portion of the Preserve and another near the Hot Springs in June.

ELK

Several sightings of elk, tracks and pellets were recorded in the Preserve. Elk were found using kipukas and on the Wapi, Kings Bowl, Minidoka, Larkspur Park, Kimama, and Bottleneck Lake lava flows. Sightings ranged from the Wood Road kipuka Trail north to Bear Park.

Conclusions

During the 2007 surveys the sample size in the spring surveys were the second smallest yet recorded. The protocol for this survey requires a minimum spring count of 100 animals and states that 200 or more animals are preferable. Smaller samples than this will have a lot of statistical variability and many normal statistical procedures are not valid. For example the over-winter survival of fawns was clearly affected by the small sample size. When the normal calculations were tested the over-winter survival was calculated to be over 100% in some years while dropping to near 50 in other years (figure 3). Since survival greater than 100% is not possible this test was able to verify the need for larger sample sizes to accurately calculate population

parameters.

After 5 years of decline, the fall deer counts showed a slight increase in females and fawns. Although, slight the changes for all age classes except yearling males were statistically significant at $p<0.05$. This suggests that after several years of decline the population may have "bottomed out" or reached the level which the area can support during the most severe drought conditions.

The continuing pattern of decline may be related to the drought conditions that predominated in the past few years. The water year (September thru August) recorded 9.39 inches of precipitation. This is lowest since record keeping was initiated in December 1958. The previous low was 9.45 in 1973-74. The average precipitation from the period June 1 to August 31 is 2.74 inches. The same period in 2007 saw only 1.3 inches of rain. This unseasonably dry summer resulted in a premature drying of forage vegetation. The lack of both water and forage in late summer likely had an affect on deer distribution although to what degree is still unknown.

Table 3 shows survey and population statistics in 3 year intervals since surveys began in 1984. Several trends are observable in this data. One is declining numbers of does and fawns in the fall survey since the mid 1980s. These data show that the counts of these two age classes are about one third of what they were in the mid 1980s for does and about one quarter for fawns. The most recent period (2005 to 2007) showed the lowest average count of both fawns and adult females. These declines are likely a result of climate and other factors already discussed.

Unlike females and fawns, male deer (both adults and yearlings) have always had comparatively low counts and they have not showed any consistent trends in their year to year numbers. This lack of trends is true both for spring (figure 2) and fall counts (figure 1). This accounts for large percentage fluctuations not having much significance. For example, an increase of 213% from 2003 to 2004 was less than half an animal per survey.

The total population estimates follow similar trends to the doe counts. That is declining numbers throughout the 1980s and mid 1990s with stabilizing numbers in the late 1990s. This was followed by a steady decline starting in 2000 and continuing through 2005 and leveling off in 2006 and 2007. This trend was likely influenced by the occurrence of frequent drought years from the mid 1980s through the early 1990s. Throughout shrub lands of southern Idaho many stand replacing fires occurred during this time period. This included the 1992 Little Prairie Fire in the monument. These environmental conditions produced poor forage conditions compared with the first few years of deer

monitoring in the monument. In the years since the drought, vegetation had begun to recover. This weather pattern may explain the stabilizing numbers in the late 1990s. Late summer 1999 through summer of 2007 has experienced a return to drought conditions and the resulting poor forage. This has likely influenced the current decline in deer numbers starting in 2000.

MOOSE

A park employee reported a moose calf in June. In late September 2 yearlings were seen in the Little Cottonwood drainage the Martin mine site. With a calf observed and yearlings leaving this may indicate the Cottonwood Creek population at Craters may become a low volume source population. Only time and additional years of observation will determine if this condition persists.

ELK

Elk sightings have expended rapidly since the state of Idaho initiated a transplant program into the BLM monument. Elk records during 2007 range nearly 25 miles from the release point. If this rate of range expansion continues it is reasonable to expect that elk could occupy essentially all of their historic range at CRMO within a few years.

Table 1. Summaries for 2003-2007 Craters of the Moon National Monument Mule Deer Survey.

SPRING	2003	2004	2005	2006	2007	15 year Average
Adult Doe	28	11	14	13	30	53
Yearlings	22	1	9	9	12	32
Yearling:100 Doe	*	*	*	*	*	60
Over-winter Survival	*	*	*	*	*	63%
Total Does	39	12	18.5	17.5	36	81
Adult Doe Ratio	72	96	76	74	83	74
FALL						
Mean # Adult Males	0.16	0.5	0.5	5.0	0.7	2.8
Percent change	-91%	213%	0	1000%	-86.7	
Mean # Yearling Male	1.5	1.7	0.3	0.3	0.8	2.8
Percent change	-13%	13%	-83%	0%	150%	
Mean # Adult Females	9.5	10.2	7.8	5.5	8.8	18.7
Percent change	-10.5%	7.3%	-23%	-29.8%	60.6%	
Mean # Fawns	9.2	6.0	5.2	4.3	6.7	17.5
Percent change	-1.1%	-34.8	-26%	-16.1%	53.8%	
MEAN TOTAL	20.4	18.4	13.8	15.2	17.2	41.4
Fawns:100 Does	97	59	66	79	75	92.8
Fawns:100 Adult Does	135	62	87	106	91	122
FALL POP'N ESTIMATES	168	155	120	130	144	315
95% CI	145-191	106-204	64-176	115-145	118-170	

* The sample sizes were too small to calculate valid estimates for these parameters. The 15 year average excludes these numbers.

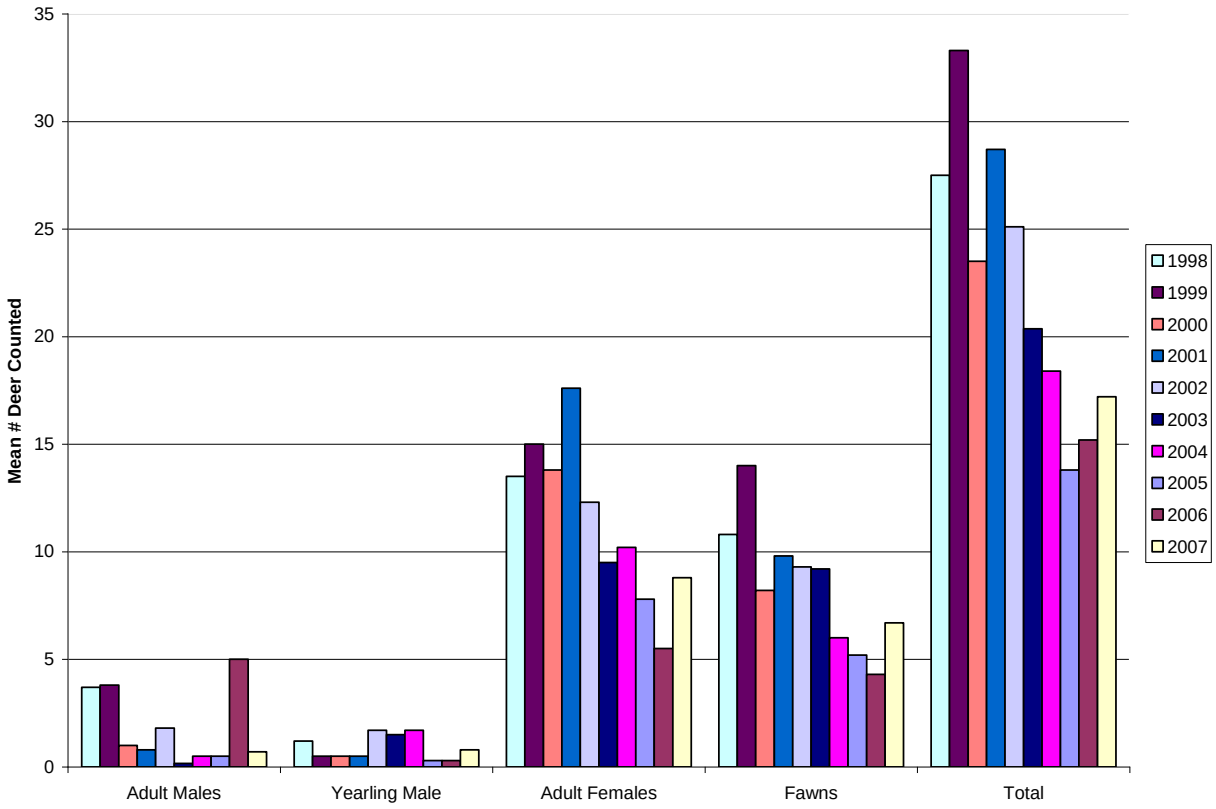

Figure 1. Mean number of mule deer counted in fall surveys 1998-2007.

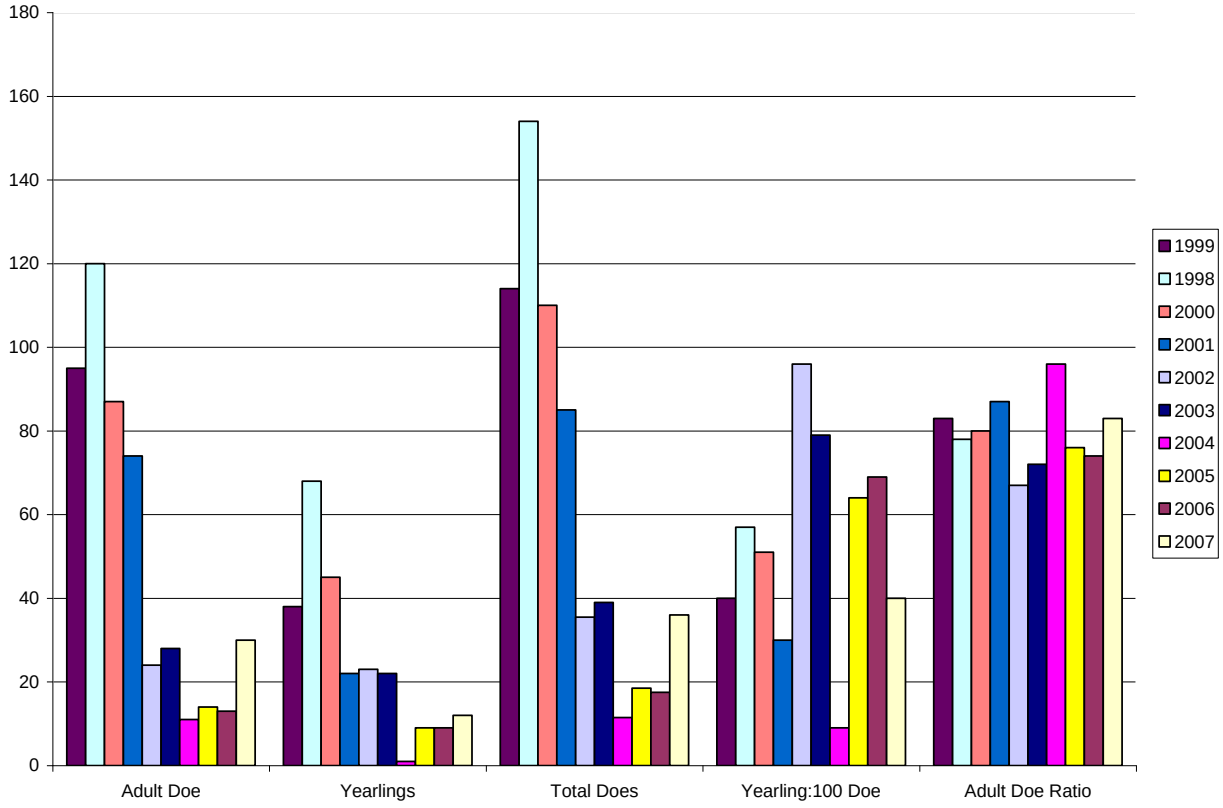

Figure 2. Number of deer counted in spring surveys 1998-2007.

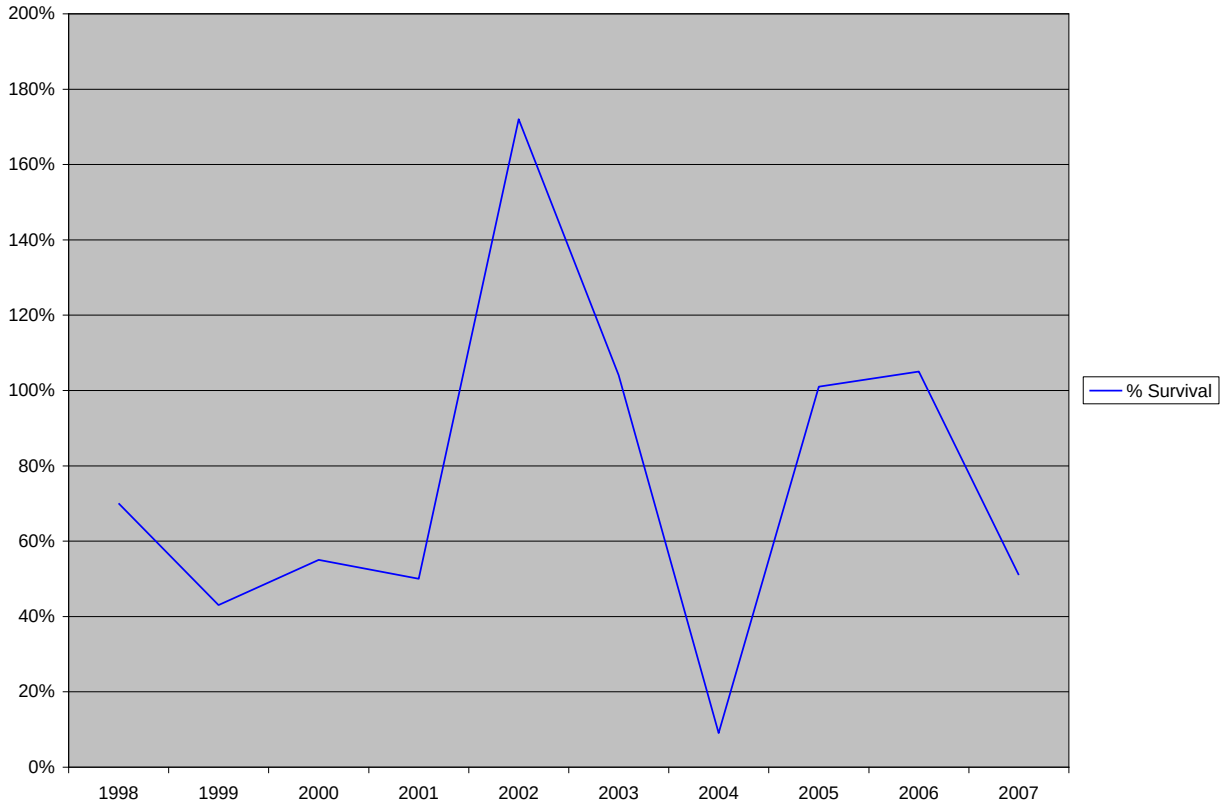

Figure 3. Calculated Percent over winter survival of fawns 1998-2007.
Values after 2002 have very small sample size and the calculations are suspect to extreme variation in the counts

Table 2. Daily survey totals, mean totals, and standard error figures for each class (age/sex) of deer in the 2007 Craters of the Moon National Monument Mule Deer Fall Survey.

		1st	2nd	3rd	4th	5th	6th	total	mean	SE	t-test P
Ault males	#	**1.0**	**1.0**	**1.0**	**1.0**	**0.0**	**0.0**	4.0	0.7	0.2	0.000
	ratio	0.1	0.2	0.1	0.1	0.0	0.0		0.1		
Yrlg males	#	**2.0**	**0.0**	**0.0**	**2.0**	**0.0**	**1.0**	5.0	0.8	0.4	0.360
	ratio	0.3	0.0	0.0	0.2	0.0	0.1		0.1		
Females	#	**7.0**	**6.0**	**8.0**	**10.0**	**14.0**	**8.0**	53.0	8.8	1.2	0.038
	ratio	100.0	100.0	100.0	100.0	100.0	100.0		100.0		
Fawns	#	**5.0**	**8.0**	**6.0**	**7.0**	**10.0**	**4.0**	40.0	6.7	0.9	0.049
	ratio	71.4	133.3	75.0	70.0	71.4	50.0		78.5		
Unknown		**0.0**	**0.0**	**0.0**	**0.0**	**1.0**	**0.0**	1.0	0.2		
Total		15.0	15.0	15.0	20.0	25.0	13.0	103.0	17.2	1.8	0.362

Significant change is the P value from a student t-test between means for 2007 and 2006 counts
ratio = the age/sex class to adult doe ratio for a survey

Table 3. Craters of the Moon National Monument Mule Deer Survey Summaries in 3 year intervals for the period 1984-2007.

	1984-86	1987-89	1990-92	1993-95	1996-98	1999-2001	2002-2004	2005-2007
SPRING								
Adult Doe	71	59	47	48	71	85	21	19
Yearling	62	40	41	16	38	35	18	10
Yearling:100 Doe	71	65	85	44	51	40	*	*
Over-winter Survival	68%	66%	79%	55%	56%	49%	*	*
Total Does	120	80	67	56	90	103	29	24
Adult Doe Ratio	0.74	0.76	0.71	0.82	0.80	0.83	0.78	0.77
FALL								
Mean # Adult Males	2.4	3.2	5.6	3.4	3.8	1.9	0.8	2.1
Percent Change		33%	75%	-39%	12%	-50%	-58%	162%
Mean # Yearling Males	4.8	4.0	2.4	1.2	2.2	0.5	1.6	0.5
Percent Change		-17%	-40%	-50%	83%	-77%	220%	-68%
Mean # Adult Females	29	27	27	12	16	12.1	10.6	7.4
Percent Change		-7%	0%	-55%	27%	-25%	-12.4%	-30%
Mean # Fawns	30	22	29	12	14	10.6	8.1	5.4
Percent Change		-26%	32%	-60%	17%	-24%	-23.6%	-33%
MEAN TOTAL	66	55	64	28	37	28.5	21.3	15.4
Fawns:100 Does	106	93	105	96	92	69	77	78
Fawns:100 Adult Does	144	123	170	116	115	90	103	95
FALL POPULATION ESTIMATES	502	417	486	228	290	179	180	131

* Statistic not calculated due to very small sample size in all three.

Fall Survey Route